



AD23V15

IMAGE AND VIDEO ANALYTICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn the basic concepts of image properties.
- To analyze the image pre-processing methods.
- To compare the various object detection techniques.
- To understand the various Object recognition mechanisms.
- To elaborate on the video analytics techniques

UNIT I INTRODUCTION

9

Image representation and image analysis tasks – Basic concepts, Image digitization, Digital image properties, Data structures for Image Analysis - Levels of image data representation, Traditional and Hierarchical image data structures.

UNIT II IMAGE PRE-PROCESSING

9

Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Edges in multispectral images - Local pre- processing in the frequency domain - Line detection by local preprocessing operators - Image restoration.

UNIT III OBJECT DETECTION USING MACHINE LEARNING

9

Object detection- Object detection methods – Deep Learning framework for Object detection, bounding box approach-Intersection over Union (IoU) –Deep Learning Architectures, Fast R-CNN, Faster R-CNN- You Only Look Once (YOLO).

UNIT IV FACE RECOGNITION AND GESTURE RECOGNITION

9

Face Recognition-Introduction-Applications of Face Recognition-Process of Face Recognition- Deep Face solution by Facebook- FaceNet for Face Recognition- Implementation using FaceNet, Gesture Recognition.

UNIT V VIDEO ANALYTICS

9

Video Processing, Use cases of video analytics, Vanishing Gradient and exploding gradient problem, ResNet architecture, Video analytics, ResNet and Inception v3.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of this course, the students will be able to:

- CO1: Understand the basics of image and preprocessing techniques for video analysis.
 CO2: Explain the techniques used for image pre-processing.
 CO3: Develop various machine learning algorithms for object detection.
 CO4: Understand the various face and gesture recognition mechanisms.
 CO5: Elaborate on deep learning-based video analytics

TEXTBOOK

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision", 4th edition, Thomson Learning, 2013. (Unit -I,II)
2. Vaibhav Verdhhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras, Apress 2021 (Unit III-V)

REFERENCE BOOK

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer Limited,2011.
2. Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, "Video Analytics for Intelligence", Springer, 2012.
3. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach" Pearson Education

